MIDDLE ATLANTIC
Region 1
HHS-N-276-2011-00003-C
Advancing Technology in Nursing Education: Integrating iPads into Clinical Practice and Patient Ed.
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01-DEC-2011-30-APR-2012
Special Funding Initiative: No
NN/LM Project Final Report
Report Submitted: 09-JUL-2012

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Executive Summary

The goal of this project encompassed the gathering and analysis of preliminary data regarding the utilization of Apple iPad 2 mobile tablet devices among nursing students and staff nurses for patient care, family/patient education activities, and general educational purposes. This grant enabled the Robert Morris University Library to acquire 10 iPad 2 devices as well a range of supporting software "apps" (applications) that were distributed to 6 RMU School of Nursing and Health Sciences students enrolled in NURS4020 in the Spring, 2012 semester who were completing a clinical rotation in the Intensive Care Unit (ICU) at UPMC-Passavant Hospital. In addition, iPads were also given to the RMU Clinical Instructor responsible for on-site educational activities, the ICU Unit Director, and the UPMC Passavant Nurse Educator. The remaining iPad was retained by the RMU Health Sciences Librarian.

Each device was downloaded with a variety of "apps" for general productivity (notepad, journaling, calendar, Internet access)as well as numerous nursing apps (Skyscape e-books, mobile NLM products, Dynamed, Epocrates, etc.). Pad recipients were encouraged to utilize the devices during the their time in the ICU as well as with patient/family education interactions when warranted. RMU students were further asked to use their iPads in the classroom environment on the RMU campus for potential activities such as BlackBoard LMS access, database searching, note taking, and e-mail.

During the course of the study, which lasted about six weeks, all participants were asked to explore, download, and evaluate other "apps" that may be relevant to their education. The primary assessment tool utilized to gauge the potential viability of the iPad 2 in the clinical setting as well as nursing education environments was a 17-question questionnaire administered at the conclusion of the hospital rotation. Students were also encouraged to provide anecdotal input on not only their experiences, but also any problems or barriers that they may have encountered. Both the Health Sciences Librarian as well as the RMU SNHS graduate student technical coordinator, physically based in the SNHS facility, frequently interacted with individual students, faculty, and UPMC Passavant staff throughout the six week period. While the results from the student assessment will be discussed in section 4 of this report, the overall reaction to the introduction and utilization of the iPad 2 into the clinical rotation as well as classroom was very positive. Based on this present experience, the iPad 2 devices will be integrated into future NURS4020 clinical rotations in the Fall, 2012 semester. In addition, once all of the survey data has been analyzed, the project managers from both Robert Morris University and UPMC Passavant will submit at least one paper for publication in a peer-reviewed nursing journal and library science journal. In addition, a poster is under development for presentation at local and regional meetings as well as at RMU and UPMC Passavant.

Minority Populations Served

African Americans: No
American Indians/Alaska Natives: No
Asian Americans: No
Hispanics/Latinos: No
Native Hawaiians and Pacific Islanders: No
Other: No

Approaches and Interventions Used

The six primary goals and objectives of this projects were:

(1) to integrate iPad 2 technology and applications ("apps") into nursing education using a student clinical rotation in a tertiary academic medical center hospital environment as well the campus classroom as the primary settings for evaluation.

(2) to encourage students, clinical instructors, nursing educators/ faculty, and health sciences librarian to explore and evaluate iPad 2 clinical nursing resources, patient education potential, and general productivity applications.

(3) to enable students, faculty, and health sciences librarian to search for, locate, examine, and evaluate the growing breadth and depth of health-related "apps" available for downloading and use in the clinical and educational settings.

(4) to facilitate patient/family-student interactions by providing technology to both quickly locate patient education information as well as effectively and easily present visual information to patients/families.

(5) to identify incentives as well as barriers to successful iPad 2 utilization in the hospital and academic environments.

(6) to assess, at least initially, the overall impact and potential of iPad 2 technology capabilities on nursing education, clinical care, patient education activities, student-clinical instructor relationships, and general academic usage.

The steps, processes, and activities utilized to achieve the goals and objectives of this project were divided into two segments. The first half of the project period dealt primarily with administrative, planning, and technical issues. The steps and activities that occurred during the time period of December 1, 2011 through February 28, 2012 included the following:

(1) Contacted and partnered with Apple's designated education consultant for Robert Morris University to obtain equipment specifications, price quotes, and purchasing procedures.

(2) Established financial and purchasing procedures as well as approval and execution of grant-related agreements, contract, and legal documents.

(3) Evaluated and selected an initial set of "apps", including nursing e-books procured from Skyscape, to be loaded onto the 10 iPad 2 devices.

(4) Developed RMU library policies and procedures for the circulation of iPad 2 devices and accessories, including lending agreements, OPAC item record creation, and appropriate usage policies in accordance with University regulations.

(5) Convened meeting at UPMC Passavant with Nursing, IT, administrative personnel, and RMU faculty to present and discuss implementation plans/timeframes, infection control ramifications, network security issues, HIPAA compliance, and enforcement of relevant UPMC policies.

(6) Investigated and addressed infection control concerns when iPads are used in close proximity to patients in the Intensive Care Unit (ICU).

(7) Developed final version of survey assessment tool for project participants. Converted

survey into electronic format using Vovici.

(8) Initiated, completed, and submitted IRB (Institutional Review Board) application for both Robert Morris University and UPMC Passavant (through PITT).

(9) Processed 10 iPad 2 devices upon receipt in early February, 2012. The primary project manager, working with the RMU SNHS Technology Coordinator Graduate Assistant registered, synced, downloaded, and tested an initial set of applications and features on each device.

(10) Prepared and delivered presentation at UMPC Passavant Intensive Care Unit on February 28, 2012 to 6 RMU nursing students, 2 RMU faculty, and 2 UPMC Passavant nurse (ICU unit director and UPMC nurse educator.) Activities included distribution of iPad 2 devices, distribution of usage guidelines (both UPMC Passavant and RMU), explanation of Infection Control precautions and procedures, comments on UPMC network Internet and Intranet access, collection of signatures on RMU user agreements and IRB consent forms, presentation of timelines and assessment activities, and discussion of HIPAA regulations and social media guidelines.

The second half of the project period, from March 1, 2012 through April 30, 2012 was largely devoted to assisting, monitoring, and data gathering of the utilization of the iPad 2 devices both in the clinical hospital environment as well as on the RMU campus by the 6 nursing students. The several steps involved in this portion of the project included:

(1) Addressing any technical issues initially encountered by students. Because the RMU SNHS curriculum requires all Nursing student to have cell phones, the technology transition to the iPad was very easy for every student. While a few minor settings on the iPads needed to be adjusted at first, all users were fully functional within a day or two of receipt of their iPad 2.

(2) Devices were recalled once during this period to allow the SNHS Technology Coordinator Graduate Assistant to update existing software as well as to install newly acquired "apps".

(3) While printing capabilities were not addressed in the original application, it was determined that some accommodation for wireless "air printing" was desired to enhance the quality of the project. After some investigation, it was determined that printing from the iPad 2 was not easily compatible with current printing protocols in the library due to the Pharos print server intervention. An Apple recommended wireless printer was purchased and will be installed in May, 2012 to facilitate printing from the iPad 2 and other mobile devices.

(4) After several collaboration between the Health Sciences Librarian and members of the Nursing faculty, it was decided to expend the remaining funds on e-book content from Skyscape that will complement the existing four required resources that were initially downloaded on all 10 iPad 2 devices. To that end, we focused on additional content in more specialized areas of nursing such as pediatrics, health assessment, medical-surgical nursing, psychiatric nursing, and geriatrics. This assortment of content is downloaded onto several different devices spread across the 10 iPads.

(5) At the conclusion of the clinical ICU rotation, RMU students returned their iPads, completed the electronic Vovici anonymous questionnaire, and were given a gift card in appreciation for their participation in this pilot project. Devices located at UPMC Passavant were retrieved and staff provided with the survey link to complete and submit.

(6) Upon return of all devices, the process of stripping any personal data (e-mail, downloaded iTunes media, personally purchased apps, etc.) will begin in anticipation of

repeating this project in the Fall, 2012 semester in the Dedicated Education Unit (DEU) environment, an ongoing collaboration between RMU and UPMC Passavant.

Evaluation Activities

The two primary vehicles for evaluation of this project was the administration of an electronic, anonymous questionnaire to the RMU student participants and the gathering of anecdotal comments from students in a variety of settings (stopping in the library, chance meetings in halls, over coffee in the school cafeteria, e-mails, and questions fielded by the technology coordinator graduate assistant located in the SNHS facility.
A seventeen question questionnaire, administered and analyzed using Vovici EFM software, was taken by all six of the students involved in the project at the conclusion of the clinical ICU rotation at UPMC Passavant in mid-April. Two UPMC Passavant staff members were given the questionnaire in paper format with instructions to return by mail at their convenience..
Preliminary analysis of the results provide substantial evidence that our original project goals and objectives were met, if not exceeded, despite the very short time period-approximately six weeks-that the students had the iPads in their possession. As evidence of the success in meeting the goals and objectives of this preliminary pilot study, the assessment results yielded the following highlights:

(1) All six RMU nursing students (100%) used their iPad at least daily or weekly during the project.

(2) All six students used their devices for both classroom as well as personal use (100%); three students used their iPads in the clinical setting (50%) [see further discussion below for potential reasons]

(3) Of those that did use the devices in the clinical ICU setting, all students used them on at least 6 occasions.

(4) In the RMU classroom setting, 5 students used their iPads either daily or weekly.

(5) For retrieval or management of personal information, 5 students (83%) used the iPad at least 6 times, with 2 students reporting a usage level of greater than 10.

(6) Of the 5 required Skyscape resources loaded onto each iPad, student reported using each resource, with the Davis' Drug Guide and the Lab and Diagnostic Handbook being the most heavily consulted resources (5 and 4 students respectively.

(7) Of the RMU Library supported resources loaded onto the iPad, the resources most heavily utilized included Blackboard Learning Management System (4 students), MedlinePlus (3 students), PubMed (2 students), CINAHL (2 students), and DYNAMED (1 student)

(8) 4 students reported encountering no barriers to the use of the iPad. Of the 2 students who did encounter barriers, both reported "discomfort with technology" and "lack of knowledge regarding the use of technology" as their reasons. None of the students indicated that "insufficient training sessions", "lack of technical support" or "lack of faculty support" were perceived as barriers.

(9) In response to the questions of "using the iPad improves my efficiency", "my experience with the iPad will encourage the future use of mobile technology, and "as an educational tool, the iPad is effective", 83% (5 out of 6) of the students either agreed or were neutral.

It should be noted that this assessment involved a very small number of participants and was conducted in two focused settings (ICU in a hospital and campus classroom) for a very short period of time. Due to these limitation, extrapolation of results to other populations and environments is not statistically possible. For the purposes of this

particular project, however, the iPads and associated software was successfully utilized by students.

One area where our goals and objectives fell short was in the patient/family education aspect. A last minute change in venue for the student clinical rotation to the Intensive Care Unit (ICU) at UPMC Passavant contributed to the lack of data collected for patient education activities. Because ICU patient are typically critically ill and often heavily sedated or unconscious, any meaningful patient education activities are few, if nonexistent. In addition, because the RMU rotation comprises only one day per week on-site, opportunities for interactions with families may also be limited.

The next iteration of the iPad project in the Fall, 2012 semester will be located in the normal location at UPMC Passavant-the Dedicated Education Unit (DEU). The DEU model, used previously with RMU nursing students at UPMC Passavant, allows for substantially increased opportunities for nursing as well as patient education because there an emphasis on teaching among the staff nurses on the unit as well as a closer alignment with the curriculum. In addition, patients in the DEU are more cognizant and "teachable moments" may be easier to implement and achieve using the iPad technology.

Problems or Barriers Encountered

Overall, the administration and implementation of this project went very smoothly and no problems or barriers of any substantial magnitude were encountered. A few minor issues that arose included:

The original timeline submitted in the application required some minor adjustments due to the holiday break in December and early January. With most academic institutions as well as their libraries closed for two weeks, some time and momentum was lost at the beginning of the period. In addition, the internal approval of contracts, account set-up with RMU finance, and similar start-up activities unexpectedly required an additional 2 weeks to complete.
It was almost 6 weeks into the project (mid-January, 2012) before equipment could be ordered.

In order to collect data, IRB applications at both RMU and UPMC Passavant had to completed, submitted, and approved. While both applications were deemed to be exempt (expedited) research, the turnaround time for approval at RMU was close to two weeks. The UPMC-Passavant IRB application had to be submitted through the University of Pittsburgh online IRB system, and was substantially more complex. In addition, the PITT IRB required that the Principal Investigator successfully complete CITI certification prior to submission and approval.

Since the iPad 2 was designed primarily to be a personal device, some minor issues and subsequent adjustments from the IT and technology perspectives were encountered. While Apple has recognized this issue and developed bulk purchasing and educational programs to minimize problems associated with adapting iPads to multiple users, several issues, including the permanent, irreversible association of e-mail accounts and credit card accounts to single devices, our IT department needed to assist the RMU Library in ensuring that each device functioned properly and had the sufficient levels of security for "public" and multiple users.

Our initial application did not include a provision for printing capabilities from the iPad. However, early into the project, students expressed a desire for printing, particularly of articles and PowerPoint slides from their classes. After some investigation and collaboration with the IT department, it was determined that current printing configurations at RMU which require Pharos print servers, student accounts to access, and networked (non-wireless) printers across campus, were not compatible with the "air" wireless printer required by iPads. To meet this need for future iPad applications in the RMU Library, a compatible "air" wireless printer recommended by Apple was acquired with the grant funds, and will be placed into service during the summer.

The last barrier encountered involved the incompatibility of the application form with the current version of MS Word. The current form is in a much older version of Word that presents compatibility and conversion issues when working with current versions. The OCR form for reporting progress also has numerous technology issues, including broken links to the "help"/"how to use the OCR" sections, and inability to print the narrative to share with colleague/collaborators, lack of any provision to easily include graphics, and frequent data losses resulted from apparent "server errors".

Continuation Plans

With a few refinements and additional content loaded onto the 10 iPads received through this outreach project, we are repeating this experience in the Fall, 2012 semester for students enrolled in NURS4020 at Robert Morris University. The clinical setting will be on the Dedicated Education Unit (DEU) at UPMC Passavant where nursing students and staff nurses utilize a model based on integrated teaching and patient care in a collaborative environment. It is anticipated that the iPad will assume a greater role in the clinical, educational, and patient education functions in the DEU than was the case in the ICU.

Also, with several months to work with RMU faculty, the Health Sciences Librarian can further integrate on a more formal basis the iPad experience deeper into the curriculum. Based on the valuable preliminary experience gained by this six month project, we are confident that the replication of this project can be positively enhanced.

Because RMU now has the equipment (iPads, printer, accessories) as well as a very strong and relevant selection of applications and electronic content (Skyscape resources, in particular) loaded onto the iPads, continuing funding and staffing will be minimal. We will continue to partner with our Apple educational consultant as well as our Skyscape contact to identify and pursue potential funding sources. As a member of the RMU School of Nursing and Health Sciences Faculty Research Group, the Health Sciences Librarian will also collaborate with members of this group to channel additional resources into advancing mobile device technology in general and iPad applications further. Because the RMU School of Nursing and Health Sciences has an extremely strong commitment to technology in nursing education, current projects such as the iPad integration is a natural fit with strong faculty and administration endorsement and support.

Impact

This project had several impacts on various levels including:

Strengthened an existing collaboration among the RMU Library, RMU School of Nursing and Health Sciences, and our clinical partner, University of Pittsburgh Medical Center-Passavant.

Enhanced the reputation of the RMU School of Nursing and Health Sciences as a leader in state-of-the-art educational technology that began with the introduction of PDAs into the curriculum in 2004 and has progressed to advanced iPhone applications in recent years, and now iPad mobile device technology in 2012.

Integrated the resources, services, role, and awareness of the RMU Library deeper into the RMU School of Nursing and Health Sciences curriculum and educational activities.

Piqued interest among several RMU SNHS faculty to explore the iPad not only for available content/apps, but also for creating and producing their own apps relevant to nursing. Of particular interest is the development of apps related to geriatrics and engaging elderly patients in activities utilizing the iPad mobile device. Exciting stuff!

The successful implementation of this projects lends itself to dissemination in several venues. The project managers have committed to writing and submitting for publication in peer-reviewed journals one or more articles that describe and provide analysis of this project. Due to the interdisciplinary nature of this project, journals in the field of nursing education, library science, and information technology are relevant and diverse venues for article submission. In addition, a poster is under development that highlights this project that will be relevant for display at local and regional nursing and library meetings. Internal publications, both at Robert Morris University as well as UPMC Passavant, have expressed an interest in writing a story on this project. Because this project will be repeated again in upcoming semesters, longitudinal and comparative data analysis will contribute to additional dissemination through articles and poster sessions.

Lessons Learned

Lessons learned from this project include:

Collaboration between academic departments (Library and School of Nursing & Health Science) as well as between institutions (Robert Morris University and UPMC Passavant) are tremendously positive learning experiences and provide not only benefits for current project, but also open doors for future collaborations.

Opportunities to interact with a variety of individuals and groups that are not normally in your own sphere of daily contacts is a very positive experience.

Successful project management requires a high degree of organization, planning, communication, frequent prodding of others, occasional "arm twisting", and patience when interacting with other department and institutions. A high level of attention to a myriad of details is also essential and ongoing.

An awareness of disparate levels of technology versions and platforms among differing entities involved in projects of this nature is essential to reduce frustration levels when incompatibility issues arise.

Frequent communication (e-mail, verbal, in person) among all participants, vendors, collaborators, and colleagues is essential to the success of projects such as this one. The advice of "when in doubt, ask!" is essential.

Because every project takes on a life of its own, strategies, particularly during the implementation phase, are often developed on the fly or as a reaction to evolving circumstances. As a result, flexibility coupled with decisive decision making is essential to success.

Within the RMU Library, the receipt and subsequent administration of this award was a first for the department, and elevated the issue of "release time" for faculty librarians to devote time and effort to activities that fall outside of the normal day-to-day job duties. While teaching faculty are eligible for release time (or course load reductions), librarians have yet to be included in this process. Hopefully, this project will spur future discussion of this issue.

Other

The project managers, both at Robert Morris University (Library and School of Nursing and Health Sciences) and UPMC Passavant (Nursing Services) express their gratitude and sincere thanks to the National Network of Libraries of Medicine/Middle Atlantic Region for the opportunity to receive and successfully implement this Technology Improvement Express Award. The valuable contributions of the RMU nursing students enrolled in NURS4020, David Williams (RMU Clinical Instructor), UPMC Passavant ICU staff, and Farhana Hamid (RMU Technology Coordinator Graduate Assistant) were greatly appreciated. In addition, many thanks to the staff NN/LM Middle Atlantic Region for their assistance throughout every phase of this project.

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Attachment 1: AR summary data: Subcontractor activities